Multiband theory for heavy-ion neutron-pair transfer among deformed Gd nuclei.

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In this paper our microscopic wave functions for Gd isotopes are applied to calculating neutron-pair transfer probabilities in heavy-ion collisions. The approximately 2600-term wave functions come from Hamiltonian matrix diagonalization of systems of 12 Nilsson neutron orbitals, nearly half-filled. We use the lowest five bands in initial and final nuclei and calculate transfer for all even spins from 0 through 30. Results for the sudden approximation (infinite moment-of-inertia) for neutron-pair extraction from ^{156}Gd by ^{58}Ni at near coulomb barrier energy, and extraction by ^{206}Pb are shown. Next neutron-pair deposition by the Ni and Pb projectiles is calculated. Finally, a finite moment-of-inertia semiclassical calculation is formulated and performed on the above collision system for n-pair transfer in both directions. The results are compared with experimental results. It is clear that the inclusion of the additional bands above the lowest two is important. Theory and experiment agree qualitatively on the rise of population above the yrast line at higher spins.

References

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